

REMARKS

The Examiner is thanked for the due consideration given the application. The specification has been amended to improve the language and to clarify incorporation by reference. A substitute abstract is provided that is within 50-150 words.

Claims 1, 2, 4-18, 20-25, 27-35 and 37 are pending in the application. Claims 3, 19, 26 and 36 have been cancelled without prejudice or disclaimer. The subject matter of cancelled claims 26 and 36 have been generally incorporated into claims 20 and 32, respectively. Claims 31 and 33 have been amended to stand as independent claims. Other claim amendments improve the language in a non-narrowing fashion.

No new matter is added to the application by any of the amendments in this paper.

The Specification

The specification is objected to as using commas instead of decimal points. The specification has been appropriately amended.

Any issues regarding incorporation by reference have been clarified by using explicit language to that effect.

The Claims

The claims have been objected to as containing informalities. The claims have been amended to be free from informalities.

Rejection Under 35 USC §112, Second Paragraph

Claims 5, 6, 8, 10, 11, 14, 17, 25, 33 and 35 have been rejected under 35 USC §112, second paragraph as being indefinite. This rejection is respectfully traversed.

The comments in the Official Action have been considered, and the claims have been amended to be clear, definite and have full antecedent basis.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

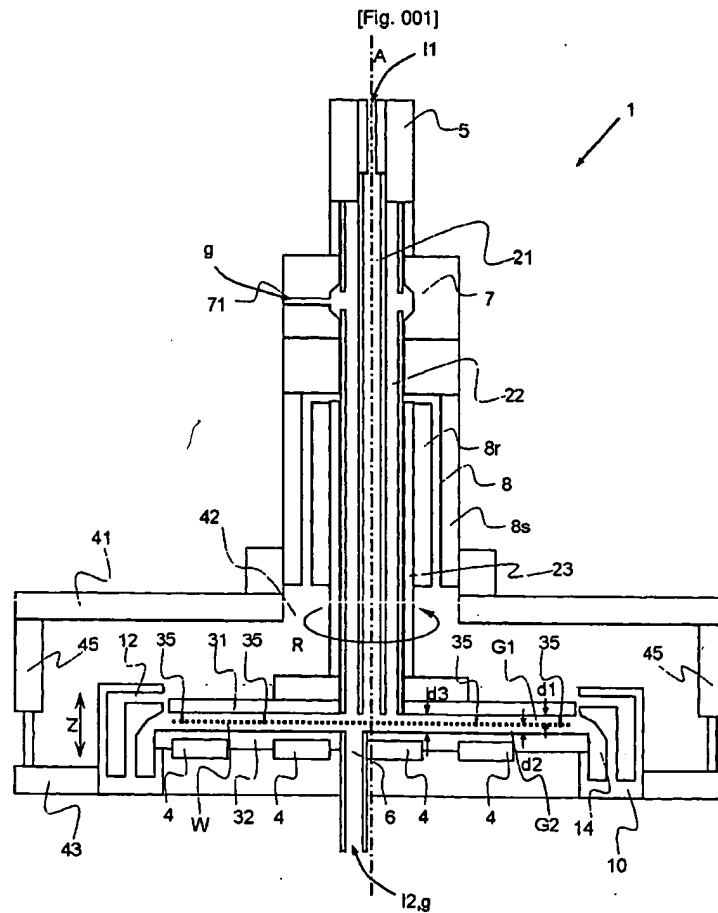
Art Rejections

Claims 1-11, 13 and 14 have been rejected under 35 USC §103(a) as being unpatentable over U.S. Patent 6,632,292 ("AEGERTER") in view of U.S. Publication 2002/0050244 ("ENGESSER") and U.S. Publication 2002/0162570 ("CAVAZZA"). Claim 12 has been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of ENGESSER and CAVAZZA, and further in view of U.S. Patent 6,890,390 ("AZAR"). Claim 15 has been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of ENGESSER and CAVAZZA, and further in view of U.S. Patent 4,401,131 ("LAWSON"). Claim 16 has been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of

ENGESSER and CAVAZZA, and further in view of U.S. Patent 5,788,453 ("DONDE"). Claim 17 has been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of ENGESSER and CAVAZZA, and further in view of U.S. Patent 6,532,977 ("OTSUKI"). Claims 18-21 have been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of CAVAZZA and JP 2001-009387 ("TADAO"). Claims 22, 23, 24, 25 and 31 have been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of ENGESSER and CAVAZZA, and further in view of U.S. Publication 2004/0132318 ("KIM"). Claims 26-30 have been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of ENGESSER, CAVAZZA, and KIM, and further in view of AZAR. Claims 32-35 have been rejected under 35 USC §103(a) as being unpatentable over AEGERTER in view of CAVAZZA, AZAR and TADAO.

All of the aforesaid rejections are respectfully traversed.

The present invention pertains to a method and device for the wet treatment of wafers that is illustrated, by way of example, in Figure 1 of the application, which is reproduced below.



As is shown in Figure 1, the present invention includes a first plate and a second plate substantially parallel to the first plate, and a wafer is held between the first and the second plate substantially parallel. A first dispenser introduces fluid into a first gap between the first plate and the wafer when being treated, and a second dispenser introduces fluid into a second gap between the second plate and the wafer when being treated. At least one vibrating element is acoustically coupled to at least the second plate, and a holder and the second plate are

rotated relative to each other about an axis substantially perpendicular to the second plate. See claim 1.

AERGERTER pertains to wafer treatment. The Official Action refers to Figure 4 of AEGERTER, which is reproduced below.

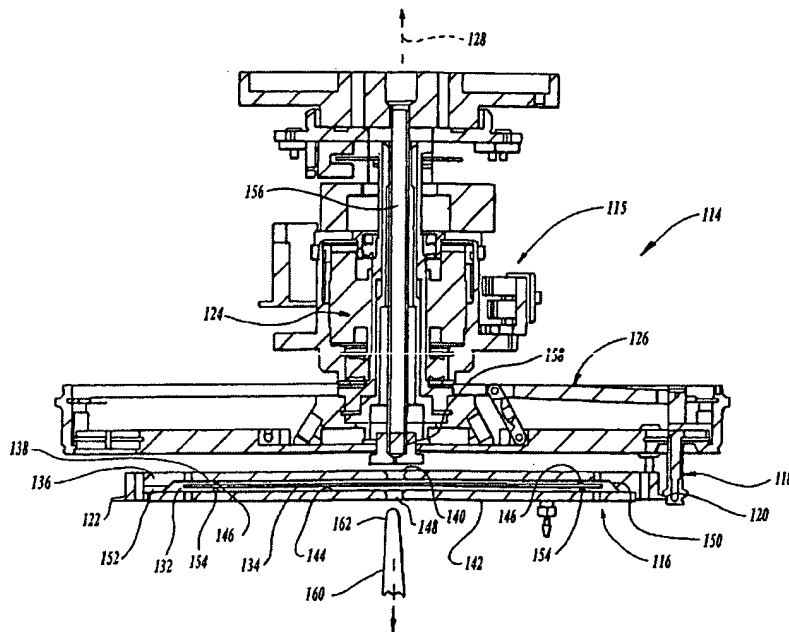


Fig.4

The device of AEGERTER includes:

- o a first plate,
- o a second plate substantially parallel to said first plate,
- o holding means for holding a wafer between said first and said second plate substantially parallel to said plates,
- o first dispensing means for introducing fluid into a first gap between said first plate and a wafer when being treated, and

o second dispensing means for introducing fluid into a second gap between said second plate and a wafer when being treated.

However, AEGERTER does not disclose:

O at least one vibrating element acoustically coupled to at least said second plate, and

O rotating means for rotating said holding means and said second plate relative to each other about an axis substantially perpendicular to said second plate.

The Official Action states (on page 8, par. 29, last sentence) that *"Aegerter discloses rotating means ... for rotating the work piece housing, which includes the wafer and the second plate relative to each other about an axis substantially perpendicular to said second plate"*.

However, this statement is respectfully disagreed to because it is not understood how it would be possible (with AEGERTER's device) to rotate the holding means and the second plate relative to each other when both the holding means (namely the holding means for holding a wafer between said first and said second plate) and the second plate are rotated together.

The holding means (in AEGERTER Figure 4) for holding a wafer between said first and said second plate are portions #146 and #154. The disc-like article is clamped between those portions (spacing members) #146 and #154, which are part of the plates #138 and #144 respectively (as described in Col. 10 lines 47-52).

Consequently, it is absolutely impossible that the wafer and the second plate can rotate relative to each other. Possibly it was not clear from the wording of the claim that the holding means rotate relative to the second plate.

Furthermore this statement (on page 8, par. 29, last sentence) is not at all understood because in par. 66 the Official Action itself states that *"Aegerter ... does not disclose that the wafer and the second plate are relatively rotated against each other"*.

As to the holding means in par. 30 (on page 8; not par. 30 on page 9), it is assumed that the Official Action refers to Figures 5-11B. AEGERTER discloses wafer support members #240 to clamp the wafer against the spacing members #255 (col. 12, 44-54). No matter what might be considered as the "second plate" it again has to be emphasized that the holding means and the second plate cannot rotate relative to each other. To the contrary, both plates and the holding means are fixed to each other so they must rotate together and cannot rotate relative to each other.

CAVAZZA pertains to a device for the wet treatment of wafers. Figure 1 of CAVAZZA is reproduced below.

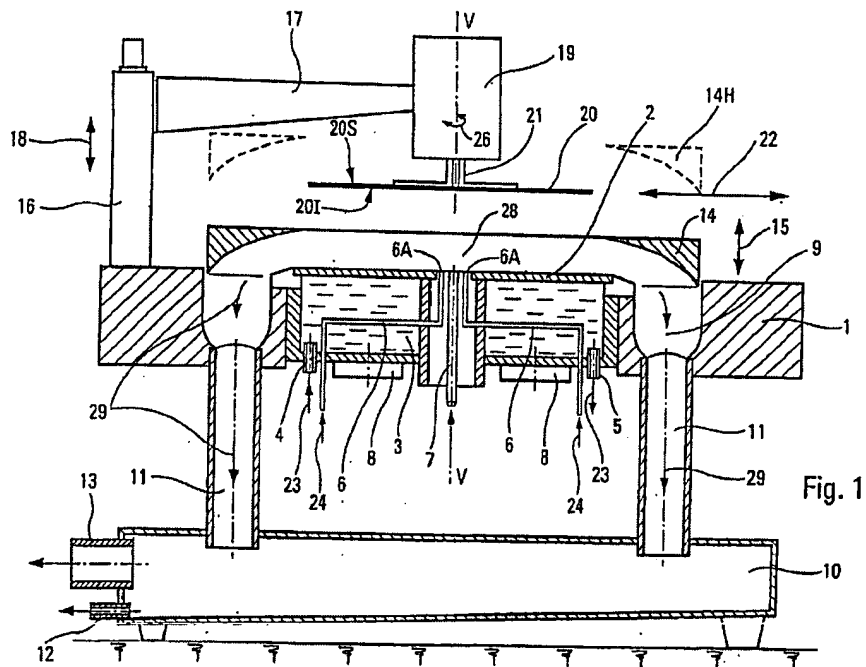


Fig. 1

The device #20 of CAVAZZA includes:

- o a first plate (namely the vacuum spin chuck #21 - but there is no gap between),
- o a second plate #2 substantially parallel to said first plate,
- o holding means for holding a wafer #20 (but the wafer is not held between the first and the second plate but rather is the wafer held by the first plate),
- o second dispensing means #6, #7 for introducing fluid into a second gap between said second plate and a wafer when being treated,
- o at least one vibrating element #8 acoustically coupled to at least said second plate, and

- o rotating means #19 for rotating said holding means and said second plate relative to each other about an axis substantially perpendicular to said second plate.

CAVAZZA however does not disclose:

- o holding means for holding a wafer between said first and said second plate substantially parallel to said plates, and
- o first dispensing means for introducing fluid into a first gap between said first plate and a wafer when being treated.

If AEGERTER is combined with CAVAZZA the vibrating elements would be part of the second plate, which would then be fixed to the wafer and the holding means and the second plate still cannot rotate relative to each other.

Turning to claim 18 of the present invention, AEGERTER discloses a method for wet treating a single wafer that includes:

- o holding a single wafer in a plane B,
- o providing a first plate having a plane A facing the wafer thereby creating a first gap of a distance d_1 ,
- o providing a second plate having a plane C facing the wafer thereby creating a second gap of a distance d_2 ,
- o inserting a first liquid into said first gap thereby substantially completely filling said first gap, and
- o inserting a second liquid into said second gap thereby substantially completely filling said second gap

AEGERTER however does not disclose:

- o applying ultrasonic energy to said second plate while less than 10% of the ultrasonic energy applied to said second plate is applied to said first plate, and

- o relatively rotating wafer and second plate against each other about a rotation axis substantially perpendicular to the wafer's main surfaces.

The Official Action acknowledges in par. 66 that "Aegerter ... does not disclose that the wafer and the second plate are relatively rotated against each other".

The Official Action cites (in par. 68) TADAO to show that it discloses "*... the first and the second plates rotating in a different direction than the wafer*" this is however not surprising because TADAO discloses a scrubbing mechanism with two scrubbers #105 and #109. For scrubbing a relative movement is necessary. The Official Action, however, does not explain why and how the teaching of TADAO should be combined with AEGERTER and what the actual outcome would be.

The Official Action asserts (in par. 69) that "*It would have been obvious ... to further modify the method taught by Aegerter and Cavazza to include relatively rotating the second plate and the wafer against each other as taught by Tadao in order to accelerate the flow of the cleaning solutions so that cleaning efficiency is increased.*" It is assumed now that Official Action provides herewith a reason why person of ordinary skill in the art should have considered TADAO.

However, the relative movement of wafer against the second plate does in fact not at all accelerate the flow of the cleaning solutions. The flow of the cleaning solution (no matter whether there is relative movement or not) is when the gap is completely filled solely influenced by the flow of the solution provided by the dispensing means. TADAO might give a hint to rotate wafer relative to a plate if there is a scrubbing member involved because when scrubbing relative movement is an absolute necessity. However, with vibrating elements there typically is never a scrubbing member involved. Consequently, one with ordinary skill would not consider TADAO.

Turning to claim 22 of the present invention, AEGERTER sets forth a device for the wet treatment of wafers that includes:

- o a first plate,
- o holding means for holding a wafer in a certain distance substantially parallel to said first plate, and
- o first dispensing means for introducing fluid into a first gap between said first plate and a wafer when being treated.

AEGERTER however does not disclose:

- o at least one vibrating element acoustically coupled to said first plate,

- o rotating means for rotating said holding means and said first plate relative to each other about an axis substantially perpendicular to said first plate, and

- o adjustment-elements are provided in order to direct ultrasonic waves at an angle α' of less than 89° to a wafer when treated.

AEGERTER therefore lacks too many features as to be considered close prior art to this embodiment of the present invention.

CAVAZZA sets forth a device for wet treatment of wafers that includes:

- o a first plate #2,
- o holding means #21 for holding a wafer #20 in a certain distance substantially parallel to the first plate #2,
- o first dispensing means #6 #7 for introducing fluid into a first gap #27 between the first plate #2 and a wafer #20 when being treated,
- o at least one vibrating element #8 acoustically coupled to the first plate,
- o rotating means #19 for rotating the holding means and said first plate relative to each other about an axis substantially perpendicular to the first plate.

CAVAZZA however does not disclose:

o adjustment-elements, which are provided in order to direct ultrasonic waves at an angle α' of less than 89° to a wafer when treated..

The other applied art references fail to address the deficiencies of AEGERTER, CAVAZZO and TADAO discussed above.

As a result, one of ordinary skill and creativity would fail to produce a claimed embodiment of the present invention from any combination of the applied art references. A *prima facie* case of unpatentability has thus not been made.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.

Charge the fee of \$440 for the two independent claims added herewith to our credit card.

Conclusion

The Examiner is thanked for considering the Information Disclosure Statement filed December 15, 2005 and for making an initialed PTO-1449 Form of record in the application.

The objections and rejections have been overcome, obviated or rendered moot, and no issues remain. The issuance of a Notice of Allowability is accordingly respectfully solicited.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any

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Appln. No. 10/560,812

overpayment to Deposit Account No. 25-0120 for any additional
fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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APPENDIX:

The Appendix includes the following item(s):

- ☐ - a terminal disclaimer
- ☐ - a 37 CFR 1.132 Declaration
- ☒ - a new or amended Abstract of the Disclosure
- ☐ - a Replacement Sheet for Figure of the drawings
- ☐ - a Substitute Specification and a marked-up copy of the
originally-filed specification
- ☐ - a verified English translation of foreign priority document